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Effect of Dislocation Cores on Surface Vicinality and Growth Rate of KH_2PO_4 {101}. J.J DE YOREO, T.A. LAND and J.D. LEE, Lawrence Livermore National Laboratory, Livermore, CA 94550. We present the results of atomic force microscopy measurements on KDP {101} which show that over the range of supersaturations, 0.03£ s £ 0.3, terrace widths on vicinal growth hillocks formed by dislocations are nearly independent of both supersaturation and dislocation structure, in contradiction to the predictions of simple BCF models. We also show that, for Burgers vectors, b, in excess of one unit step height, the dislocations generate hollow cores with radii whose magnitude and dependence on Burger's vector is in accordance with theoretical predictions. Analytical and numerical results are presented which show that a model that takes into account the effect of these cores on the period of step rotation predicts a dependence of vicinal slope on s and b which is in good agreement with the experimental results. The effect of the core perimeter on the step transit time dominates the effect of reduced step velocity due to stresses near the core. Consequently, a simple analytical expression can be used to describe the slope even when step kinetics are anisotropic. Using these results we explain the reproducible character of the macroscopic growth rate, R, and rescale the data on R(T,s) onto a single curve which follows an Arrhenius relationship. From this data we derive an activation barrier for elementary step motion of 0.3eV. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. W-7405-ENG-48.